

IN THE CLAIMS

The following is a complete listing of the claims. This listing replaces all earlier versions and listings of the claims.

Claim 1 (currently amended): A method of modifying the geometric orientation of a digital image in an image acquisition apparatus adapted to acquire an image ~~in one amongst several~~ from at least one of a plurality of different orientations and to store ~~[[said]] the~~ image in ~~[[the]] a~~ form of a compressed file, ~~characterised in that it comprises the following~~ said method comprising the steps of:

acquiring ~~[[an]] the~~ image in a chosen orientation;

identifying ~~[[said]] the~~ chosen orientation;

converting ~~[[said]] the~~ image into a digital image;

spectral transforming ~~[[said]] the~~ digital image;

determining a geometric transformation to be applied to ~~[[said]] the~~ image acquired as a function of the chosen orientation;

applying the determined geometric transformation ~~determined~~ to symbols associated with spectral coefficients issuing ~~[[from]] in~~ said spectral transforming step;

recording in the compressed file two indicators representing a normal or reversed order of the symbols respectively in two directions of the digital image; and

coding the digital image in ~~[[said]] the~~ compressed file.

Claim 2 (currently amended): ~~[[The]]~~ A geometric orientation modification method according to Claim 1, ~~characterised in that it includes a~~ further comprising the step of quantizing the spectral coefficients before ~~[[the]]~~ said step of applying the geometric transformation, ~~[[said]]~~ the symbols being quantization symbols.

Claim 3 (currently amended): ~~[[The]]~~ A geometric orientation modification method according Claim 1, ~~characterised in that said~~ wherein the spectral transforming performed in said spectral transforming step is a multiresolution decomposition, such as a wavelet spectral decomposition.

Claim 4 (currently amended): ~~[[The]]~~ A geometric orientation modification method according to Claim 1, ~~characterised in that the~~ wherein said step of identifying the chosen orientation is implemented by an automatic orientation detector incorporated in ~~[[said]]~~ the image acquisition apparatus.

Claim 5 (currently amended): ~~[[The]]~~ A geometric orientation modification method according to Claim 1, ~~characterised in that the~~ wherein said step of identifying the chosen orientation is implemented by a manual orientation selector incorporated in ~~[[said]]~~ the image acquisition apparatus.

Claim 6 (currently amended): ~~[[The]]~~ A geometric orientation modification method according to Claim 1, ~~characterised in that~~ wherein the image acquisition orientation is chosen from amongst a rotation through 90 degrees, a rotation through 180 degrees or a rotation through 270 degrees.

Claim 7 (currently amended): ~~[[The]]~~ A geometric orientation modification method according to Claim 1, ~~characterised in that said~~ wherein the spectral transformation transforming performed in said spectral transforming step is a multiresolution spectral decomposition, such as a wavelet spectral decomposition, and ~~in that it also comprises~~ includes a step of ~~transposition of~~ transpositioning a frequency sub-band having coefficients of low frequency in a first direction of the digital image and of high frequency in a second direction of the digital image with a frequency sub-band of the same resolution level in the spectral decomposition, having coefficients of high frequency in ~~[[said]]~~ the first direction and of low frequency in ~~[[said]]~~ the second direction when the geometric transformation comprises a rotation through 90 degrees or 270 degrees.

Claim 8 (currently amended): ~~[[The]]~~ A geometric orientation modification method according to Claim 1, ~~characterised in that it also comprises~~ further comprising a step of ~~transposition of~~ transpositioning the values of the height and width of the image when the geometric transformation applied comprises a rotation through 90 degrees or 270 degrees.

Claim 9 (currently amended): A device for modifying the geometric orientation of a digital image incorporated in an image acquisition apparatus adapted to acquire an image in accordance with ~~one amongst several~~ at least one of a plurality of different orientations and to store ~~[[said]]~~ the image in the form of a compressed file, ~~[[having]]~~ said device comprising:

means for acquiring ~~[[an]]~~ the image in a chosen orientation;

means for identifying ~~[[said]]~~ the chosen orientation;

means for converting ~~[[said]]~~ the image into a digital image;

means for spectral ~~transformation of said~~ transforming the digital image;

means for determining a geometric transformation to be applied to ~~[[said]]~~ the image acquired as a function of the chosen orientation;

means for applying the determined geometric transformation ~~determined~~ to symbols associated with spectral coefficients issuing from ~~[[said]]~~ the spectral transformation performed by said spectral transforming means;

means for recording in the compressed file two indicators representing a normal or reversed order of the symbol respectively in two directions of the digital image; and

means for coding the digital image in ~~[[said]]~~ the compressed file.

Claim 10 (currently amended): ~~[[The]]~~ A geometric orientation modification device according to Claim 9, ~~characterised in that it has~~ further comprising means for quantizing the spectral coefficients adapted to quantize ~~[[said]]~~ the spectral coefficients before application of the geometric transformation, ~~[[said]]~~ the symbols being quantization symbols.

Claim 11 (currently amended): ~~[[The]]~~ A geometric orientation modification device according to Claim 9, ~~characterised in that said~~ wherein the spectral transformation performed by said spectral transforming means is a multiresolution spectral decomposition, such as a wavelet spectral decomposition.

Claim 12 (currently amended): ~~[[The]]~~ A geometric orientation modification device according to Claim 9, ~~characterised in that the~~ wherein said means for identifying the chosen orientation ~~comprise~~ includes an automatic orientation detector incorporated in said image acquisition apparatus.

Claim 13 (currently amended): ~~Geometric~~ A geometric orientation modification device according to Claim 9, ~~characterised in that the~~ wherein said means for identifying the chosen orientation ~~comprise~~ includes a manual orientation selector incorporated in said image acquisition apparatus.

Claim 14 (currently amended): ~~[[The]]~~ A geometric orientation modification device according to Claim 9, ~~characterised in that~~ wherein the image acquisition orientation is chosen from amongst a rotation through 90 degrees, a rotation through 180 degrees or a rotation through 270 degrees.

Claim 15 (currently amended): ~~[[The]]~~ A geometric orientation modification device according to Claim 9, ~~characterised in that said~~ wherein the spectral transformation performed by said spectral transforming means is a multiresolution spectral decomposition, such as a wavelet spectral decomposition, and in that it also comprises means for ~~transposition~~ transpositioning a frequency sub-band having coefficients of low frequency in a first direction of the digital image and of high frequency in a second direction of the digital image with a frequency sub-band of the same resolution level in the spectral decomposition, having coefficients of high frequency in ~~[[said]]~~ the first direction

and of low frequency in ~~[[said]]~~ the second direction when the geometric transformation comprises a rotation through 90 degrees or 270 degrees.

Claim 16 (currently amended): ~~[[The]]~~ A geometric orientation modification device according to Claim 9, ~~characterised in that it also has further~~ comprising means for transposing the values of the height and width of the image when the geometric transformation applied comprises a rotation through 90 degrees or 270 degrees.

Claim 17 (currently amended): ~~[[The]]~~ A geometric orientation modification device according to Claim 9, ~~characterised in that the~~ wherein said means for ~~[[the]] spectral transformation of said~~ transforming the digital image, ~~[[the]]~~ said means for determining a geometric transformation, ~~[[the]]~~ said means for applying the geometric transformation, ~~[[the]]~~ said means for entering indicators in the compressed file, ~~[[the]]~~ said coding means, and if applicable ~~[[the]]~~ said quantization and transposition means, are incorporated in:

a microprocessor,

a read only memory containing a program for modifying the geometric orientation of ~~[[a]]~~ the digital image, and

a random access memory containing registers adapted to record variables modified during the running of ~~[[said]]~~ the program.

Claim 18 (currently amended): An image processing method, implemented in an image acquisition apparatus, comprising the steps of~~[[;]]~~:

generating image data representing an image;

wavelet-transforming the image data;
quantizing the transformed data; [[and]]
entropically encoding the quantized data;~~characterized in that said~~
~~method further comprises the steps of:~~
identifying a correct orientation of the image represented by the
image data, from among four possible orientations, as a function of the position of the
image acquisition apparatus; and
applying a geometric transformation to the transformed data in
accordance with the result of the identification.

Claim 19 (currently amended): A method according to Claim 18,
~~characterized in that~~ wherein the image data are transformed into sub-bands corresponding
to each of a plurality of resolution levels in said wavelet-transforming step.

Claim 20 (canceled)

Claim 21 (currently amended): A method according to Claim 18,
~~characterized in that~~ wherein said method further comprises the step of storing the
information showing the result of the identification, and the encoded data.

Claim 22 (currently amended): An image processing apparatus, comprising:
means for generating [[an]] image data representing an image;
means for wavelet-transforming the image data;
means for quantizing the transformed data; [[and]]

means for entropically encoding the quantized data; ~~characterized in that said apparatus further comprises;~~

means for identifying a correct orientation of the image represented by the image data from among four possible orientations, as a function of the position of said image processing apparatus; and

means for applying a geometric transformation to ~~[[said]]~~ the transformed data in accordance with the result of the identification.

Claim 23 (currently amended): An apparatus according to Claim 22, ~~characterized in that~~ wherein said wavelet-transforming means transforms the image data into sub-bands corresponding to each of a plurality of resolution levels.

Claim 24 (canceled)

Claim 25 (currently amended): An apparatus according to Claim 22, ~~characterized in that~~ wherein said apparatus further comprises ~~[[the]]~~ means ~~[[of]]~~ for storing the information showing the result of the identification, and the encoded data.

Claim 26 (currently amended): An image acquisition apparatus, ~~characterised in that it~~ wherein said apparatus has a geometric orientation modification device according to Claim 9.

Claim 27 (currently amended): A digital photographic apparatus, ~~characterised in that it~~ wherein said apparatus has a geometric orientation modification device according to Claim 9.

Claim 28 (currently amended): A digital camera adapted to function in a still image mode, ~~characterised in that it~~ wherein said camera has a geometric orientation modification device according to Claim 9.

Claim 29 (currently amended): A storage means, readable by a microprocessor, ~~characterized in that it~~ wherein said storage means is adapted to implement the geometric orientation modification method according to Claim 1.

Claim 30 (currently amended): A storage means, readable by a microprocessor, ~~characterized in that it~~ wherein said storage means is adapted to implement the image processing method according to Claim 18.

Claim 31 (currently amended): A computer program product, loadable into a programmable processing apparatus, ~~characterized in that it~~ wherein said computer program product comprises software code ~~portions~~ adapted to ~~implement~~ execute the geometric orientation modification method according to Claim 1.

Claim 32 (currently amended): A computer program product, loadable into a programmable processing apparatus, ~~characterized in that it~~ wherein said computer

program product comprises software code portions adapted to ~~implement~~ execute the image processing method according to Claim 18.